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ECONOMIC PROJECTIONS OF MINIMUM SIZED PLYWOOD MILLS FOR THE BLACK HILLS REGION

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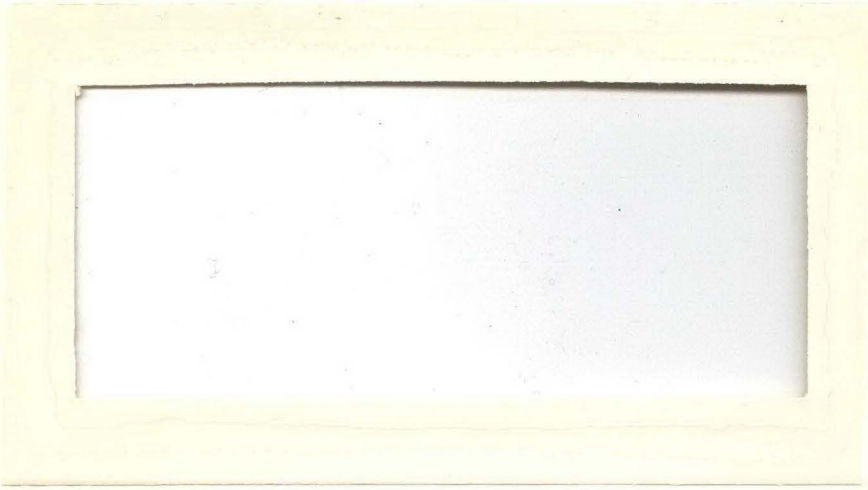

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REPORT ON

ECONOMIC PROJECTIONS OF MINIMUM SIZED PLYWOOD MILLS FOR THE BLACK HILLS REGION

TO

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
ROCKY MOUNTAIN FOREST AND RANGE
EXPERIMENT STATION
FORT COLLINS, COLORADO

By

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FEBRUARY 6, 1969

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A. INTRODUCTION

The following report encompasses a brief study of the economics of establishing and operating a plant to produce plywood from the Ponderosa Pine timber in the Black Hills area of South Dakota. It is assumed the plant will be located somewhere in the Rapid City area.

The report is intended to be used in conjunction with a larger overall study of the economics of the utilization of timber resources available in the area.

The primary objective of the study is to determine the minimum economic size mill which it is practical to establish, and to set forth the basic construction costs and the projected operating economics.

B. DISCUSSION OF FACILITIES AND ECONOMIC FACTORS

Capacity of Mill

Based on recent experience with two small successful sheathing plants of 25 MM (3/8") and 36 MM (3/8") annual capacity, it was felt that projections should be made at two levels - 24 MM and 36 MM capacity.

Description of Facilities for 24 MM Production

The mill projected for 24 MM production would feature a high speed lathe with no tray system, a direct transfer through the single clipper, with a single sorting chain and a tipple stacker. The dryer would be direct fired gas jet, with 4 decks, 12 sections and 2 cooling sections. The press would be 20 opening, steam heated with hand loading and unloading. Plant equip-

ment would include sawing, jointing patching equipment, and auxiliaries and utilities as listed in the detailed cost estimate. No provision for sanding is included. Steam for the press and block steaming vats is provided by gas fired package boilers.

Plant operation would include one shift on the debarker and lathe line, three shifts on the dryer and press, and one shift in panel finishing and shipping.

Description of Facilities for 36 MM Production

The mill projected for 36 MM production would feature a high speed lathe line with a four deck tray system and a single clipper. The dryer is a direct gas fired jet, 4 decks, 16 sections, with three cooling sections. The press includes thirty openings (but convertible to 36), with automatic loading and unloading. Other plant equipment, auxiliaries. and utilities as listed in the cost estimates.

The plant operation would include one shift on the debarker, two shifts on the lathe, three shifts on the dryers, two shifts on the press, and one on panel finishing.

Discussion of Economic Factors

The accompanying graphs and tables indicate projected values of potential profits, as well as the derivation of the major economic factors. The basic calculations were made on the basis of a $60.00 log cost (as prevailing in early 1968), and an $85.00 sheathing market (1/2" 5 ply C-D Interior). Subsequent projections were made at log costs of $80.00 and $100.00, and at market values of $95.00, 105.00, and 115.00, and the

resulting values of projected profits are plotted against market levels on Figure 1. Since the profit margin increases or decreases inversely as the wood cost (wood cost = log cost ÷ 2.4), additional values can be plotted on the graph at various log costs if desired. It should be noted that when the profit before taxes and interest reaches zero value (as indicated by the break-even line on Figure 1) the depreciation allowance is still available in the form of cash flow, representing annual returns of $146,000.00 and $190,000.00 for production levels of 24 MM (3/8) and 36 MM (3/8) respectively.

An average hourly wage rate of $2.50 was selected rather than the lower rates now prevailing in the area. Wage scales in Rocky Mountain plywood plants are currently at the $2.50 level, and it is felt that for the longer term, Black Hills rates will follow.

C. CONCLUSIONS AND RECOMMENDATIONS

The economic projections indicate quite clearly that at market levels of $85.00, and corresponding log costs of $70.00 or less, a plant will be profitable at either the 24 MM level or at 36 MM. It is equally obvious, however, that a plant operating at the 36 MM level, while costing 30% more, will produce 50% more plywood, and in addition develop approximately $2.60 per thousand more gross profit.

Whether productive capacities of 24 MM (3/8) or 36 MM (3/8) per year are considered, or even higher levels, it is apparent that the size and nature of the timber will require facilities for processing logs too small for the plywood operation, or not peelable due to other causes. These facilities should also be selected for processing the cores from the veneer lathe.

The factors which have been developed by the veneer and plywood test runs, and the data developed in the tables and computations developed herein all indicate that it is feasible and practical to establish a successful plywood operation either at the 24 MM level or at the 36 MM level.

While it looks as if the 36 MM level operation would be considerably more profitable and less vulnerable to the normal economic fluctuations, when considered in concert with related facilities for timber utilization other factors must be considered in the choice of plant size.

As set forth in Section A, one of the objectives of this study was to set forth the basic operating economics. These have been established as indicated and presented in a form which will enable them to be used in pro-

jecting profitability and amortization values in conjunction with related facilities.

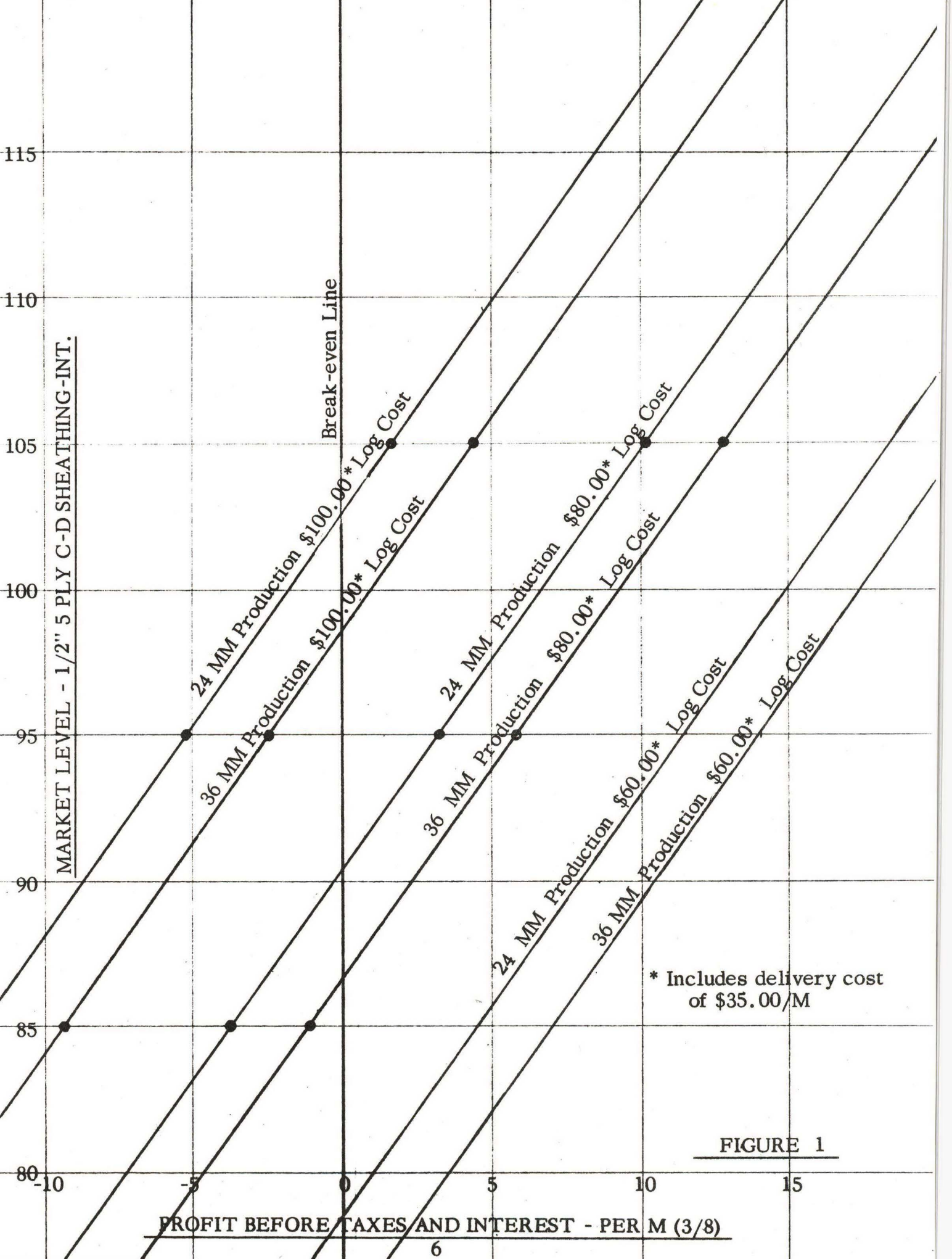
MARKET LEVEL - 1/2" 5 PLY C-D SHEATHING-INT.
115
110
105
100
95
90
85
80
-10
-5
0
5
10
15
Break-even Line
24 MM Production $100.00* Log Cost
36 MM Production $100.00* Log Cost
24 MM Production $80.00* Log Cost
36 MM Production $80.00* Log Cost
24 MM Production $60.00* Log Cost
36 MM Production $60.00* Log Cost
* Includes delivery cost of $35.00/M
PROFIT BEFORE TAXES AND INTEREST - PER M (3/8)

FIGURE 1

PRO-FORMA PROFIT PROJECTIONS

MARKET-LOG COST	SALES RETURN (Net)	COST of MANUFAC.	COST of LOGS	COST of GOODS SOLD	INCOME from CHIPS	PROFIT BEFORE TAXES & INT.
24 MM PRODUCTION						
85.00 - 45.00	65.59	40.59	33.33	73.92	4.55	-3.78
95.00 - 45.00	72.67	40.59	33.33	73.92	4.55	3.30
105.00 - 45.00	79.58	40.59	33.33	73.92	4.55	10.21
115.00 - 45.00	86.49	40.59	33.33	73.92	4.55	17.12
85.00 - 65.00	65.59	40.59	41.66	82.25	4.55	-12.11
95.00 - 65.00	72.67	40.59	41.66	82.25	4.55	-5.03
105.00 - 65.00	79.58	40.59	41.66	82.25	4.55	1.88
115.00 - 65.00	86.49	40.59	41.66	82.25	4.55	8.79
36 MM PRODUCTION						
85.00 - 45.00	65.59	37.99	33.33	71.32	4.55	-1.18
95.00 - 45.00	72.67	37.99	33.33	71.32	4.55	5.90
105.00 - 45.00	79.58	37.99	33.33	71.32	4.55	12.81
115.00 - 45.00	86.49	37.99	33.33	71.32	4.55	19.72
85.00 - 65.00	65.59	37.99	41.66	79.65	4.55	-9.51
95.00 - 65.00	72.67	37.99	41.66	79.65	4.55	-2.43
105.00 - 65.00	79.58	37.99	41.66	79.65	4.55	4.48
115.00 - 65.00	86.49	37.99	41.66	79.65	4.55	11.39

SALES RETURN PROJECTIONS

MARKET LEVEL INDEX	AVERAGE SELLING PRICE	DISCOUNTS & SALES COSTS (-)	FREIGHT RATE GAIN (+)	RETURN FROM SALES
85.00	66.92	8.33	7.00	65.59
95.00	75.05	9.38	7.00	72.67
105.00	82.85	10.37	7.00	79.58
115.00	90.85	11.36	7.00	86.49

LOG COST PROJECTIONS

ALTERNATE	STUMPAGE	DELIVERY	TOTAL LOG COST	RECOVERY (3/8) (PLYWOOD)	WOOD COST (3/8)
(A) (15.00 Stumpage)	25.00*	35.00	60.00	2.4	25.00
(B) (45.00 Stumpage)	45.00	35.00	80.00	2.4	33.33
(C) (65.00 Stumpage)	65.00	35.00	100.00	2.4	41.66

* Includes special allowances

PRO-FORMA ANNUAL PROFIT AND LOSS STATEMENT - TYPICAL YEAR

24 MM (3/8) PER YEAR PRODUCTION
$60.00 LOG COST

GROSS PLYWOOD SALES	AMOUNT	AVERAGE (Per M3/8)
Plywood 24,000,000 sq.ft. (3/8)	$1,606,080.00	$ 66.92
Less: Trade Discounts 5%, 3% (.0785)	(126,870.00)	(5.25)
Cash Discounts 2%	(29,584.00)	(1.23)
Sales Cost 3%	(44,376.00)	(1.85)
Sub-Total	1,405,250.00	58.59
Gain From Freight Rate Differential	168,000.00	7.00
Total Return From Plywood Sales	1,573,250.00	65.59
COST OF GOODS SOLD		
Direct Labor 245 days @$1756.80	430,416.00	17.93
Supervision	27,450.00	1.14
Glue and Chemicals	113,280.00	4.72
Depreciation	146,000.00	6.08
Insurance	8,400.00	.35
Taxes	36,000.00	1.50
Operating Supplies and Expenses	12,000.00	.50
Maintenance Supplies and Expenses	30,000.00	1.25
Electricity	66,000.00	2.75
Natural Gas	66,395.00	2.77
Office, Clerical, & Management Expense	24,000.00	1.00
Association Dues and Expenses	14,400.00	.60
Cost of Manufacturing	974,341.00	40.59
Cost of Logs	600,000.00	25.00
Cost of Goods Sold	1,574,341.00	65.59
PROFIT AND CASH FLOW		
Plywood Gross Profit	(1,091.00)	(.05)
Income From Chips	109,200.00	4.55
Profit Before Taxes and Interest	108,109.00	4.50
Depreciation Reserve	146,000.00	6.08
Total Cash Flow	254,109.00	10.58
Reserve For Taxes (52%)	(56,217.00)	(2.34)
Net Cash Flow with Reserve For Taxes Deducted, and Before Interest Charges	$ 197,892.00	$ 8.24

PRO-FORMA ANNUAL PROFIT AND LOSS STATEMENT - TYPICAL YEAR

36 MM (3/8) PER YEAR PRODUCTION
$60.00 LOG COST

GROSS PLYWOOD SALES	AMOUNT	AVERAGE (Per M-3/8)
Plywood 36,000,000 sq.ft. (3/8)	$2,409,200.00	$ 66.92
Less: Trade Discounts 5%, 3% (.0785)	(189,122.00)	(5.25)
Cash Discounts 2%	(44,402.00)	(1.23)
Sales Cost 3%	(66,602.00)	(1.85)
Sub-Total	2,109,074.00	58.59
Gain From Freight Weight Differential	252,000.00	7.00
Total Return From Plywood Sales	2,361,074.00	65.59
COST OF GOODS SOLD		
Direct Labor 245 days @$2416.00	592,043.00	16.45
Supervision	40,260.00	1.12
Glue and Chemicals	169,920.00	4.72
Depreciation	190,000.00	5.28
Insurance	12,600.00	0.35
Taxes	54,000.00	1.50
Operating Supplies and Expenses	18,000.00	.50
Maintenance Supplies and Expenses	45,000.00	1.25
Electricity	99,000.00	2.75
Natural Gas	96,040.00	2.67
Office, Clerical, & Management Expense	28,800.00	.80
Association Dues and Expenses	21,600.00	.60
Cost of Manufacturing	1,367,263.00	37.99
Cost of Logs	900,000.00	25.00
Cost of Goods Sold	2,267,263.00	62.99
PROFIT AND CASH FLOW		
Plywood Gross Profit	93,811.00	2.60
Income From Chips	163,280.00	4.54
Profit Before Taxes and Interest	257,091.00	7.14
Depreciation Reserve	190,000.00	5.28
Total Cash Flow	447,091.00	12.42
Reserve For Taxes (52%)	(133,687.00)	(3.71)
Net Cash Flow with Reserve For Taxes Deducted, and Before Interest Charges	$ 313,404.00	$ 8.71

AVERAGE SALES PRICE (3/8) FROM ASSUMED PRODUCTION OF SHEATHING ON AN $85.00 SHEATHING MARKET (1/2" 5 PLY CD-INT.)

ITEM	% OF PROD.	EQUIV. FOOTAGE (3/8)	LIST PRICE*	SURFACE FOOTAGE	GROSS REVENUE
3/4"5PLY CD	3%	1.1 MM	$124.00	0.6 MM	$74,400.00
5/8"5PLY CD	25%	9.0 MM	104.00	5.4 MM	561,600.00
1/2"5PLY CD	45%	16.2 MM	92.00	12.2 MM	1,122,400.00
3/8"3PLY CD	24%	8.6 MM	66.00	8.6 MM	567,600.00
5/16"3PLY CD	3%	1.1 MM	64.00	1.3 MM	83,200.00
	100%	36.0 MM			$2,409,200.00

Average selling price 3/8" basis $2,409,200.00 ÷ 36.0 MM = $66.92

* Prices shown as listed in Crows Weekly Plywood Letter 6/14/68
Std. Ext. Glue.

FREIGHT RATE DIFFERENTIALS

	WEST COAST RATE* (Per M 3/8)	BLACK HILLS RATE** (Per M 3/8)	DIFFERENCE (Per M 3/8)
Minneapolis	$13.39	$5.60	$7.79
Chicago	15.08	8.00	7.08
Detroit	16.77	11.50	5.27
Omaha	13.39	5.20	8.19
Milwaukie	15.08	7.90	7.18
Moline	14.52	7.00	7.52
Indianapolis	16.65	10.80	5.85
St. Joseph, Missouri	13.39	6.30	7.09
Average Differential***			$7.00

* Based on "Incentive" or large cars, and shipping weight of 1125 Lb/M Douglas Fir.

** Based on Ponderosa Pine shipping weight of 1010 Lb/M (3/8).

*** Assuming equal portions of product sold and shipped to each of the destinations listed, or to points of equal rate differential.

WOOD COST

$60.00 LOG COST

COST OF LOGS

STUMPAGE	$21.43
LOGGING AND DELIVERY	35.00
ALLOWANCES	3.57
TOTAL	$60.00

PLYWOOD RECOVERY

2.4 sq.ft. (3/8) Finished Plywood per M Board Feet of Logs

LOG REQUIREMENT - ANNUAL

PLYWOOD PRODUCTION	24 MM (3/8)	36 MM (3/8)
LOG REQUIREMENT	10.0 MM	15.0 MM
LOG COST (@60.00/M)	$ 600,000.00	$ 900,000.00

WOOD COST

LOG COST	$ 600,000.00	$ 900,000.00
PLYWOOD PRODUCTION	24 MM (3/8)	36 MM (3/8)
WOOD COST	$25.00	$25.00

SUMMARY OF COST ESTIMATE

		24 MM PLANT	36 MM PLANT
A.	SITE DEVELOPMENT	$142,400.00	$151,600.00
B.	LOG DEBARKING AND BUCKING	243,000.00	243,000.00
C.	BLOCK STEAMING VATS	48,000.00	72,000.00
D.	BUILDINGS	288,250.00	493,000.00
E.	PLYWOOD MACHINERY AND EQUIPMENT	825,900.00	1,068,900.00
F.	PLANT SYSTEMS AND MISCELLANEOUS EQUIPMENT	267,000.00	347,000.00
G.	PLANT UTILITIES	160,000.00	212,000.00
H.	MOBILE EQUIPMENT	125,500.00	143,500.00
J.	OFFICE BUILDING, EQUIPPED	23,000.00	34,500.00
	SUB-TOTAL	$ 2,123,050.00	$ 2,765,500.00
	CONTINGENCIES (5%)	106,000.00	138,000.00
	ENGINEERING (5%)	106,000.00	138,000.00
	TOTAL	$ 2,335,050.00	$ 3,041,500.00

A. SITE DEVELOPMENT

		24 MM	36 MM
A-1	SITE ACQUISITION 50 Acres @2,000.	$100,000.00	$100,000.00
A-2	GRADING AND FILL	8,000.00	12,000.00
A-3	PAVING	8,000.00	12,000.00
A-4	RAILROAD SPURS (2000'@12.00)	24,000.00	24,000.00
A-5	DRAIN TILE AND CULVERTS	2,400.00	3,600.00
	TOTAL	$142,400.00	$151,600.00

B. LOG DEBARKING AND BUCKING

B-1	DEBARKER	60,000.00	60,000.00
B-2	LOG DECKS AND BLOCK CONVEYOR	80,000.00	80,000.00
B-3	BUCKING SAWS	18,500.00	18,500.00
B-4	REFUSE CONVEYORS	18,000.00	18,000.00
B-5	REFUSE BURNER	20,000.00	20,000.00
B-6	FOUNDATIONS	12,000.00	12,000.00
B-7	ELECTRICAL WIRING	21,000.00	21,000.00
B-8	HYDRAULIC SYSTEMS	13,500.00	13,500.00
	TOTAL	$243,000.00	$243,000.00

C. BLOCK STEAMING VATS

C-1	STEAMING VATS	(4) 36,000.00	(6) 54,000.00
C-2	STEAM CONTROL AND PIPING	12,000.00	18,000.00
	TOTAL	$ 48,000.00	$ 72,000.00

D. BUILDINGS

		24 MM*	36 MM**
D-1	BUILDING (2.25/sq.ft.)	$146,250.00	$225,000.00
D-2	FOUNDATIONS (0.65/sq.ft.)	42,250.00	65,000.00
D-3	PAVING (0.60/sq.ft.)	39,000.00	60,000.00
D-4	LIGHTING (0.30/sq.ft.)	19,500.00	30,000.00
D-5	SPRINKLERS (0.45/sq.ft.)	29,250.00	45,000.00
	SUB-TOTAL (4.25/sq.ft.)	$276,250.00	$425,000.00
	MISCELLANEOUS PARTITIONS AND OFFICES	12,000.00	18,000.00
	TOTAL	$288,250.00	$443,000.00

* 65,000 square feet of building.

** 100,000 square feet of building.

E. PLYWOOD MACHINERY AND EQUIPMENT

E-1	LATHE LINE	315,000.00	380,000.00
E-2	VENEER DRYING EQUIPMENT	191,000.00	233,000.00
E-3	VENEER JOINTING AND EDGE GLUING	54,000.00	54,000.00
E-4	VENEER PATCHING & MISCELLANEOUS	30,900.00	46,900.00
E-5	PRESS LINE (WITH PRE-PRESS)	150,000.00	270,000.00
E-6	SAW LINE-GRADING-STRAPPING	85,000.00	85,000.00
	TOTAL	$825,900.00	$1,068,900.00

F. PLANT SYSTEMS AND MISCELLANEOUS EQUIPMENT

		24 MM	36 MM
F-1	REFUSE HOG AND CONVEYOR	$ 14,000.00	$ 14,000.00
F-2	PNEUMATIC REFUSE CONVEYOR	36,000.00	36,000.00
F-3	GLUE AND CHEMICAL FACILITIES	30,000.00	30,000.00
F-4	ELECTRICAL WIRING AND SWITCH-GEAR	100,000.00	150,000.00
F-5	AIR COMPRESSORS AND PIPING	16,000.00	24,000.00
F-6	SMALL TOOLS AND EQUIPMENT	15,000.00	15,000.00
F-7	KNIFE GRINDER	7,000.00	7,000.00
F-8	MACHINERY FOUNDATIONS	40,000.00	60,000.00
F-9	FACTORY TRUCKS	4,000.00	6,000.00
F-10	PACKAGE TURNER	5,000.00	5,000.00
	TOTAL	$267,000.00	$347,000.00

G. PLANT UTILITIES

G-1	UNDERGROUND FIRE MAINS, PUMPS, AND RESERVOIR	60,000.00	80,000.00
G-2	TRANSFORMERS AND ELECTRIC SUPPLY	24,000.00	36,000.00
G-3	GLUE WASHDOWN SYSTEM	5,000.00	5,000.00
G-5	SANITARY SEWAGE DISPOSAL SYSTEM	3,500.00	3,500.00
G-6	WATER SUPPLY SYSTEM	2,500.00	2,500.00
G-7	BOILER INSTALLATION AND STEAM PIPING	65,000.00	85,000.00
	TOTAL	$160,000.00	$212,000.00

H. MOBILE EQUIPMENT

		24 MM	36 MM
H-1	LOG HANDLING MACHINE	$ 75,000.00	$ 75,000.00
H-2	BLOCK HANDLING MACHINE	21,000.00	21,000.00
H-3	FACTORY LIFT TRUCKS	27,000.00	45,000.00
H-4	UTILITY TRUCK (3/4 ton)	2,500.00	2,500.00
	TOTAL	$125,500.00	$143,500.00

J. OFFICE

J-1	OFFICE BUILDING	18,000.00	27,000.00
J-2	OFFICE FURNITURE AND EQUIPMENT	5,000.00	7,500.00
	TOTAL	$ 23,000.00	$ 34,500.00

SUPERVISION SUMMARY

	24 MM	36 MM
PLANT SUPERINTENDENT	$15,000.00	$18,000.00
DAY FOREMAN	---	7,500.00
SWING SHIFT FOREMAN	7,500.00	7,500.00
THIRD SHIFT FOREMAN	---	---
TOTAL	$22,500.00	$33,000.00

22,500. x 1.22* = $27,450.00 (1.14)

33,000. x 1.22 = $40,260.00 (1.12)

*22% Markupfor payroll taxes, fringe benefits, vacation pay, and shift differentials.

MANPOWER SUMMARY

	SHIFTS	24 MM PLANT		SHIFTS	36 MM PLANT	
	1	2	3	1	2	3
Log Lift Truck	1	0	0	1	0	0
Barker Operator	1	0	0	1	0	0
Bucking Saw	1	0	0	1	0	0
Block Lift Truck	1	0	0	1	1	0
Deck Man	1	0	0	1	1	0
Lathe Operator	1	0	0	1	1	0
Clipper Lineup	0	0	0	1	1	0
Clipperman	1	0	0	1	1	0
Green Sorters	3	0	0	4	4	0
Green Lift Truck	1	1	1	1	1	1
Dryer Feeder	1	1	1	1	1	1
Dryer Tender	1	0	0	1	0	0
Dry Sorters	2	2	2	3	3	3
Graders	1	1	1	1	1	1
Jointer-Edge Gluer	1	0	0	1	1	0
Veneer Patchers	1	1	0	2	2	2
Dry Lift Truck	1	1	1	1	1	1
Reclip, Relief, Misc.	2	2	2	3	2	2
Stock Rustler	1	1	1	1	1	1
Glue Mixer	1	0	0	1	0	0
Layup	4	4	4	8	8	0
Press Operators	2	2	2	1	1	0
Saw Operator-Grader	1	0	0	1	0	0
Panel Patchers	2	0	0	2	2	0
Panel Lift Truck	1	1	0	1	1	1
Shipping	2	0	0	2	0	0

MANPOWER SUMMARY CONTINUED

	SHIFTS	24 MM PLANT		SHIFTS	36 MM PLANT	
Shipping Lift Truck	0	0	0	1	0	0
Master Mechanic	1	0	0	1	0	0
Millwright	1	1	0	1	1	0
Millwright Helper	0	0	0	0	1	0
Watchmen	0	0	1	0	0	1
Boiler Tenders	1	1	1	1	1	1
Shift Totals	38	18	16	47	37	15
Plant Total			72			99

LABOR COST SUMMARY

Assumed Hourly Average Wage Rate $2.50

24 MM PLANT

72 Men @ 8 hours x $2.50 = $1,440.00

1440.00 x 1.22 = $1,756.80

36 MM PLANT

99 Men @ 8 hours x $2.50 = $1,980.00

1980.00 x 1.22 = $2,416.00

*22% Markup for payroll taxes, fringe benefits, vacation pay, and shift differentials.